



## 6N80

Preliminary

Power MOSFET

### 6A, 800V N-CHANNEL POWER MOSFET

#### DESCRIPTION

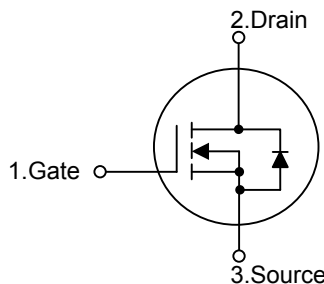
The UTC **6N80** is a N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology specialized in allowing a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **6N80** is universally applied in high efficiency switch mode power supply.

#### FEATURES

- \*  $R_{DS(on)} = 2.0\Omega @ V_{GS} = 10V$
- \* Improved dv/dt capability
- \* Fast switching
- \* 100% avalanche tested

#### SYMBOL

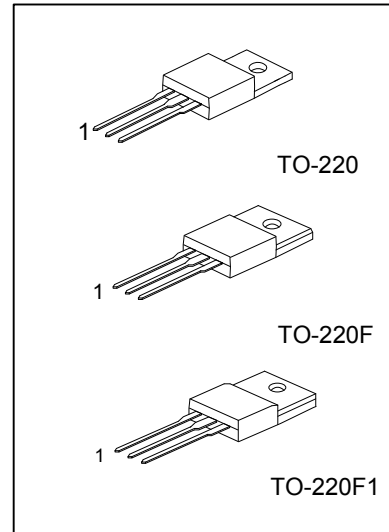


#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N80L-TA3-T	6N80G-TA3-T	TO-220	G	D	S	Tube
6N80L-TF3-T	6N80G-TF3-T	TO-220F	G	D	S	Tube
6N80L-TF1-T	6N80G-TF1-T	TO-220F1	G	D	S	Tube

Note: Pin Assignment: G: Gate D: Drain S: Source

<p>6N80L - TA3 - T</p>	<p>(1) T: Tube (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1 (3) G: Halogen Free, L: Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ( $T_c=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	800	V
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V
Drain Current (Note 1)	Continuous	$I_D$	6	A
	Pulsed	$I_{DM}$	22	A
Avalanche Energy	Single Pulsed (Note 2)	$E_{AS}$	680	mJ
	Repetitive (Note 1)	$E_{AR}$	15.8	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	$P_D$	138	W
	TO-220F/TO-220F1		51	W
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55~+150	$^\circ\text{C}$

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2.  $L = 37\text{mH}$ ,  $I_{AS} = 6\text{A}$ ,  $V_{DD} = 50\text{V}$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$

3.  $I_{SD} \leq 5.5\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{DD} \leq BV_{DSS}$ , Starting  $T_J = 25^\circ\text{C}$

4. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	$\theta_{JC}$	0.9	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.45	$^\circ\text{C}/\text{W}$

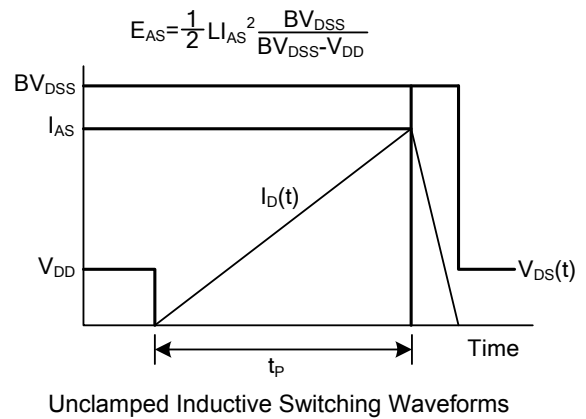
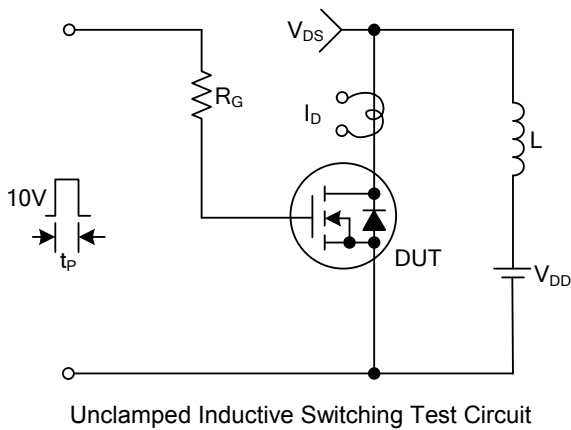
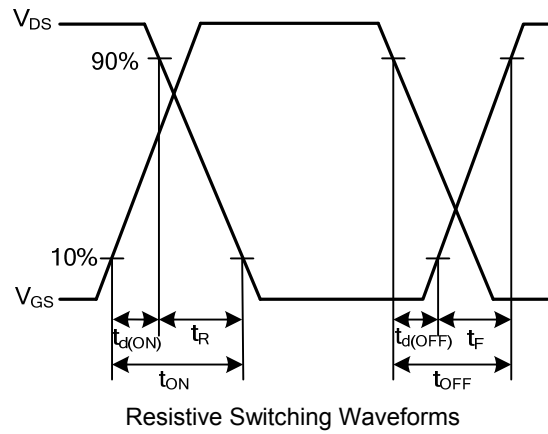
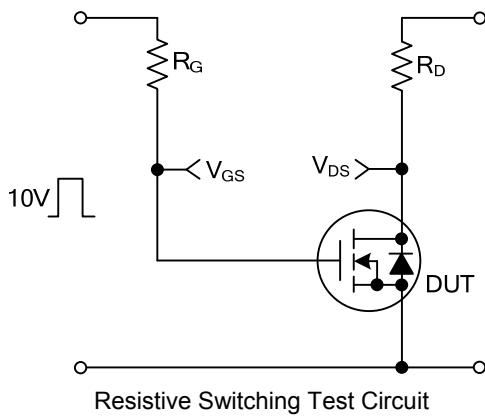
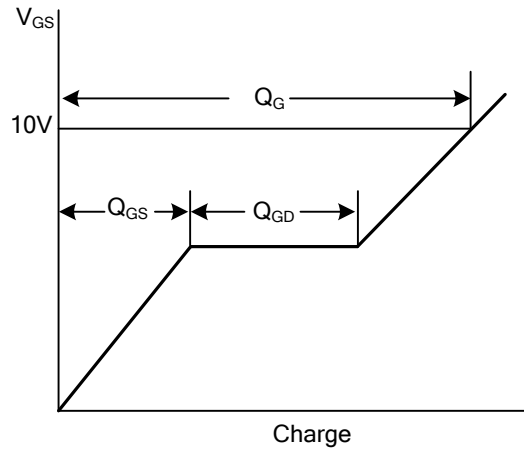
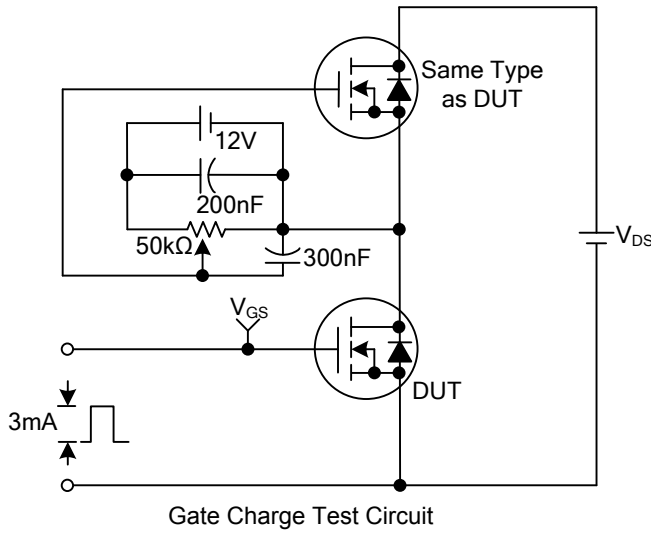
■ ELECTRICAL CHARACTERISTICS ( $T_C=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>OFF CHARACTERISTICS</b>								
Drain-Source Breakdown Voltage		$BV_{DSS}$	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	800			V	
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ\text{C}$ , $I_D=250\mu\text{A}$		0.97		$\text{V}/^\circ\text{C}$	
Drain-Source Leakage Current		$I_{DSS}$	$V_{DS}=800\text{V}$ , $V_{GS}=0\text{V}$			10	$\mu\text{A}$	
			$V_{DS}=640\text{V}$ , $T_C=125^\circ\text{C}$			100		
Gate- Source Leakage Current	Forward	$I_{GSS}$	$V_{GS}=+30\text{V}$ , $V_{DS}=0\text{V}$			100	nA	
	Reverse		$V_{GS}=-30\text{V}$ , $V_{DS}=0\text{V}$			-100	nA	
<b>ON CHARACTERISTICS</b>								
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	3.0		5.0	V	
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10\text{V}$ , $I_D=3\text{A}$		1.6	2.0	$\Omega$	
Forward Transconductance		$g_{FS}$	$V_{DS}=50\text{V}$ , $I_D=3\text{A}$ (Note 1)		5.4		S	
<b>DYNAMIC PARAMETERS</b>								
Input Capacitance		$C_{ISS}$	$V_{GS}=0\text{V}$ , $V_{DS}=25\text{V}$ , $f=1.0\text{MHz}$		1010	1310	pF	
Output Capacitance		$C_{OSS}$			90	115		pF
Reverse Transfer Capacitance		$C_{RSS}$			8	11		pF
<b>SWITCHING PARAMETERS</b>								
Total Gate Charge		$Q_G$	$V_{GS}=10\text{V}$ , $V_{DS}=640\text{V}$ , $I_D=6\text{A}$ (Note 1, 2)		21	30	nC	
Gate to Source Charge		$Q_{GS}$			6			nC
Gate to Drain Charge		$Q_{GD}$			9			nC
Turn-ON Delay Time		$t_{D(ON)}$	$V_{DD}=400\text{V}$ , $I_D=6\text{A}$ , $R_G=25\Omega$ (Note 1, 2)		26	60	ns	
Rise Time		$t_R$			65	140		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			47	105		ns
Fall-Time		$t_F$			44	90		ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>								
Maximum Body-Diode Continuous Current		$I_S$				6	A	
Maximum Body-Diode Pulsed Current		$I_{SM}$				22	A	
Drain-Source Diode Forward Voltage		$V_{SD}$	$I_S=6\text{A}$ , $V_{GS}=0\text{V}$			1.4	V	
Reverse Recovery Time		$t_{rr}$	$I_S=6\text{A}$ , $V_{GS}=0\text{V}$ ,		615		ns	
Reverse Recovery Charge		$Q_{RR}$	$dI_F/dt=100\text{A}/\mu\text{s}$ (Note 1)		5.4			$\mu\text{C}$

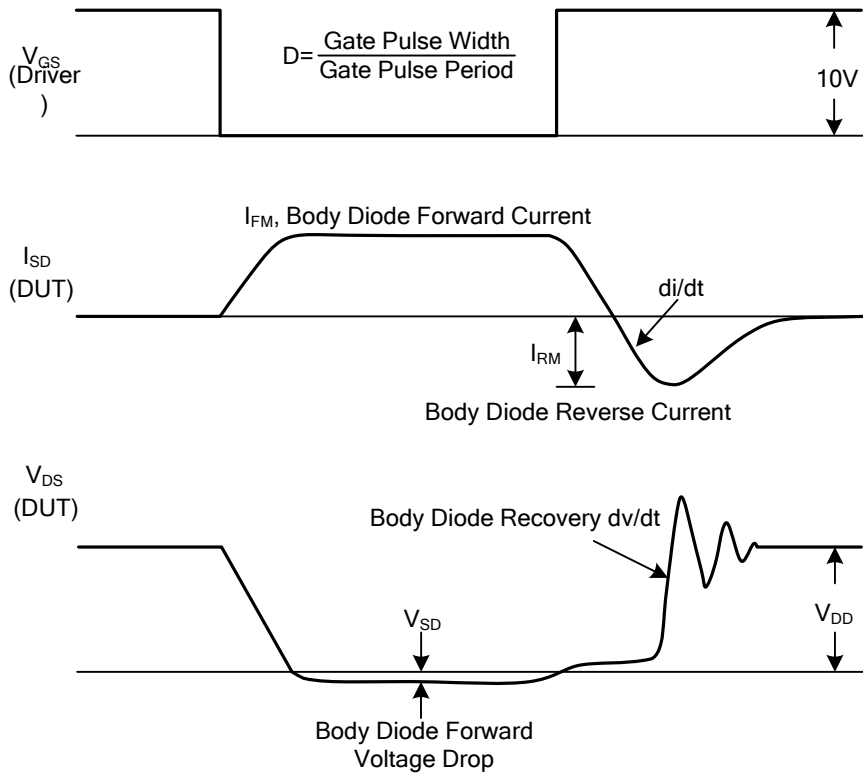
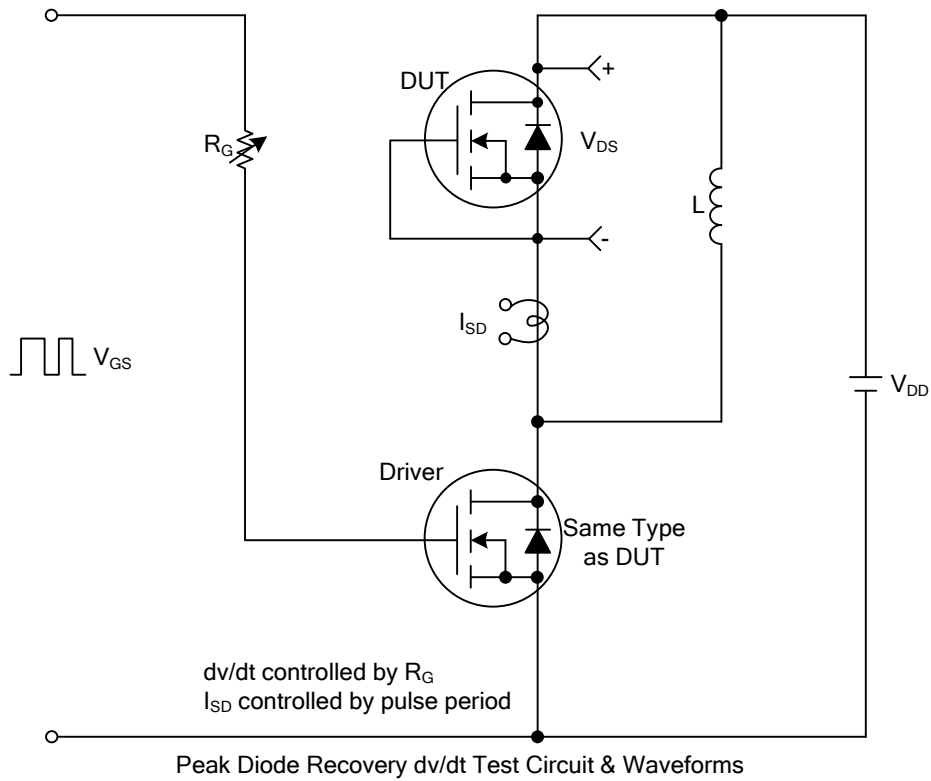
Note: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS



■ TEST CIRCUITS AND WAVEFORMS(Cont.)



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